

extensive temperature survey has been made of the district. Thermographs have been exposed only during

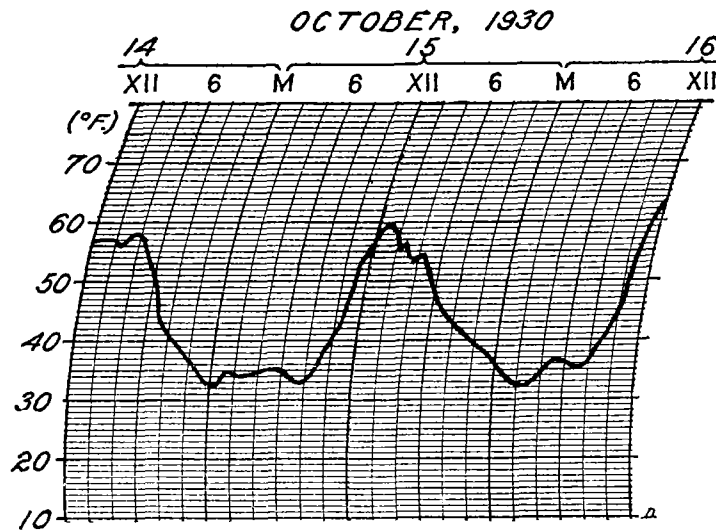


FIGURE 2.—Thermograph trace, Dillard, Oreg., October 15-16, 1930, showing the effect of fog in retarding temperature fall

two frost seasons at two stations in separate regions. Some variation in temperature between these stations has been noted on nights with varying local fog conditions.

VALUABLE AID AT PLANTING TIME

Another important service that the Weather Bureau renders the melon industry is at planting time in the

early spring, when the weather is still much unsettled. As cantaloupe seed will germinate only under favorable weather conditions, planting must be avoided just previous to a cold, rainy period or one with strong, drying northerly or easterly winds. The kind of weather that is expected to prevail not only determines the time but also the depth the seed should be planted for best results. The growers state that the availability of this service has done much to take one of the major risks of melons in the Umpqua Valley—that of uncertain stands—from the industry. The crop must be started as early as possible after the frost danger is past in the spring in order that the maturing season may be well advanced before the coming of cooler fall weather, with its possibility of frost. Hence, frost protection in the spring is not a factor to be considered.

The aid the Weather Bureau has been able to give the melon growers has played no little part in the development of this rapidly expanding industry in this valley.

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WEATHER CONDITIONS AFFECTING THE PORT OF NEW ORLEANS

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[Weather Bureau, Washington, May, 1931]

Out of a number of years' experience with the public contacts of the Weather Bureau Office at New Orleans in connection with requests for information about weather and climatic conditions, I have formed some judgments regarding those features of the climate that appear to be of most practical concern to the business of the port. A detailed discussion of the records supporting these judgments can not be presented at this time, but the following general statements may have suggestive value.

1. General weather conditions, especially with respect to wind and fog, are decidedly favorable to commerce through the port of New Orleans. Average wind velocities are low, only 7.5 miles per hour for the year, and less than 9 miles per hour in March, the month of highest average wind. Maximum velocities exceed 26 miles per hour on an average of only 15 days per year, and maximum velocities of 45 miles per hour have been exceeded in only 2 of the 12 months, namely, August and September, when tropical storms have caused storm conditions producing higher wind velocities. Fog frequency affecting the water front is not fully represented by the records taken at the Weather Bureau office, but fogs of a duration sufficient to delay commerce more than a day are of relatively infrequent occurrence, and accidents due to fog are uncommon. River fogs are of somewhat greater frequency and duration than those which occur at moderate distance from the river, because the cold water coming down from the north during spring months contributes to highly localized fog formation when warm waves bring moist southerly currents inland from the Gulf to be chilled on contact with the cold river surface. The shallow nature of this localized

river fog permits shipping to be moved at times from masthead lookout when dense fog conditions prevail at the level of the deck. Most cases of fog delay are measured in terms of a few hours only.

2. Examination of the records of storms affecting the port of New Orleans indicates that tornadoes are relatively unimportant—indeed, almost unknown. Only one authentic tornado has occurred in the immediate vicinity in 25 years, the one case being in October, 1906, when damage estimated at \$300,000, with 21 persons injured, but no deaths, occurred in a tornadic path 4 miles long. Local storms of damaging violence, several of which may have been very small tornadoes or incipient tornadoes, have been recorded on seven other dates in 35 years of records for that vicinity, with damages running over \$25,000 in only three of the seven cases.

Ten tropical cyclones are recorded in the Gulf region in 25 years, but only a few of these storms have directly affected the port of New Orleans to more than very minor degree. Shipping bound to or from New Orleans has been lost in a few instances; however, the losses at sea in this period have been remarkably few in the Gulf region, and I dare say less in proportion than the losses to North Atlantic commerce due to extratropical storms.

Only two storms in the weather history of the port of New Orleans during the last 35 years have been weather events of serious magnitude. The greatest damage resulted from the tropical hurricane of September 29, 1915, with an earlier severe but less damaging hurricane of September 20, 1909. Even in these cases, however, the principal maritime losses were confined to the smaller craft, such as tugs, barges, derricks, small river steamers, etc.

There is no doubt that under modern conditions, which permit the Weather Bureau to issue accurate warnings of the existence and progress of hurricanes while they are still at sea, the interests concerned with storm hazards can do much toward safeguarding shipping and commodities from threatened damage. There is also no doubt that a repetition of a hurricane along a track to bring the center inland from the Gulf near and slightly to westward from New Orleans will again cause much damage in spite of all possible precautions. Nevertheless, the storm hazard, measured either in terms of frequency or in percentage of total values lost by storm, is relatively low.

3. The physical location of the port of New Orleans, many miles from open Gulf waters, fully protects the harbor from damage by storm tides. In the 1915 hurricane the level of the river was raised about 6 feet, due to the effects of the tide, but the fluctuation of river levels by reason of the annual flood flow is very much greater than this amount, and ranges upward to 20 feet in a year of large flood.

The fluctuation of 15 to 20 feet in the annual course of river stages does offer some disadvantages to commerce, and these changes in river level, resulting, as they do, from weather conditions in the valley above, may be classed as a climatic characteristic of the port. Local changes in the river bottom accompany the alternation between flood and low water. The advent of extreme low water each year almost invariably calls for considerable dredging at wharf sides and in slips in locations where there is an accumulation of sediment during high stages. In other places floods regularly produce a damaging erosion that involves occasional rebuilding of wharves and levees or calls for costly protective measures. These matters are of course not direct charges upon the business of the port, as the costs are covered by State or Government funds, but the expenditures are properly chargeable to the overhead of port operations.

4. The high total of annual precipitation might be thought to indicate considerable interference with the business operations and commerce at New Orleans. This is not the case. Rainfall is more generally of the intense shower type than of the long-drawn-out character more commonly experienced in cooler climates. The highest hourly frequency of rainfall in any month is 10 to 14 per cent in the warmer part of the day, from June to September. The hourly frequency does not exceed 8 per cent in any other month of the year, and is as low as from 1 to 3 per cent in many hours. Excessive precipitation is less damaging to commerce over the wharves than in other parts of the city, because the river banks are the highest land surfaces, with the slope gradually dropping away from the river, as is common in all true delta regions. Drainage is excellent.

5. While rainfall may thus be shown to be a minor factor in the flow of commerce through the port of New Orleans, it must be admitted that there is considerable difficulty in protecting some commodities from damage by reason of the high *absolute* humidity of the air. Due to the higher average temperatures than those prevailing in other major ports of the United States where *relative* humidities are quite similar, the atmosphere at New Orleans actually carries a much larger quantity of water vapor. Packaged foods, such as cereals, granulated and powdered sugars, canned goods, and some other commodities, as charcoal and chemicals, subject to hygroscopic influences, may suffer considerably in storage and handling due to this feature of the climate.

On the other hand, some commodities are probably handled to advantage because of the higher humidities.

Cotton, for instance, received at New Orleans from the more arid regions of the Southwest gains appreciably in bale weights by absorption of moisture, and this change represents gain to the buyer at arid loading point who sells on the weight at New Orleans.

Two other specific examples of the troublesome consequences of high absolute humidity affecting some commodities handled at New Orleans will give point to this phase of the climate in its effects on commerce. Granulated sugar, especially in bags, but to a considerable extent also in wax packages, cakes badly, especially in winter. The remarkable intensification of this problem in winter was difficult to explain on general grounds, because the absolute humidities are of course highest in summer. The cost of handling and regranulating spoiled packages was sufficiently serious to set several of the large sugar companies to a scientific investigation of the underlying conditions. The investigation revealed that the sugar caked most seriously, not when the humidity remained steadily high but when high humidity was followed by a spell of abnormally dry weather. Such variations can only occur at New Orleans with the alternation between warm and cold wave type conditions characteristic of the colder part of the year. The explanation appears to be something like this: High absolute humidity increases the natural moisture film on the sugar grain to an extent which may reach the point of some coalescence between particles in contact. The dehydration attending a few days of unusually low humidity then results in some recrystallization of this sugar film, which cements the granules into a caked mass.

The other instance, of similar obscure nature, occurred in connection with a series of fires attributed to spontaneous combustion in car-lot charcoal shipments moving to New Orleans from a point 500 miles in the interior.

A business of \$100,000 annually was threatened with extinction by the increasing insurance rates following the large number of fires experienced in transit. Again a technical investigator was placed on the trail, and the trouble was located and cured. Charcoal, fresh from the furnaces, is highly hygroscopic and heats upon absorption of moisture. Therefore, the shipments which were loaded at relatively low humidity absorbed enough moisture from the more humid coastal atmosphere to set up spontaneous combustion from the heat generated in the interior of some of the carloads. A positive cure for the evil consisted in wetting down the fresh charcoal when it went from the furnaces into the loading bins, where it cured for a few days prior to shipment.

6. Temperature influences on the commerce of New Orleans are in the main unimportant except in connection with one major item of imports, namely, bananas. The critical temperature for bananas is about 40° F., as the fruit does not ripen properly if it has been chilled below that degree of temperature. Unloading of banana cargoes is an open-air process, which is greatly hampered when temperatures fall below 40° and must be stopped entirely when the temperatures fall toward freezing. Average conditions at New Orleans are very favorable for this commerce, as few occasions demand delay or special precaution in transfer of bananas from ship to car.

SUMMARY

Climatic conditions bearing upon the commerce of the port of New Orleans are more favorable than otherwise, with the sole exception of the hazard of severe tropical storm, which is infrequent, having occurred only twice in the last 35 years.